OPERATOR'S MANUAL

FDS-100 MINIFILE

SK 232D-SP7
SERIAL 0226

G.U.C. PRODUCTS
Santee, California

PRODUCT WARRANTY

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SPECIFICATIONS

STORAGE CAPACITY	88,960 Bytes net (-SP2), or 178,560 Bytes net (-SP7)
FILES MAINTAINED	26 maximum per diskette
INTERFACE	Serial, asynchronous, RS-232C levels 8 bit data 1 start bit 1, 1½, 2 stop bits
CONNECTOR	DB25S - 25 position dataphone
BAUD RATES	50, 75, 110, 135, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600
PACKAGE	Portable with carring handle 5¼" H x 10" W x 10½" D
POWER	115 VAC, 47-63 Hz, 0.5A 230 VAC, 47-63 Hz, 0.3A (optional)
RECORDING MEDIUM	5¼" floppy diskette double sided (-SP7) single sided (-SP2) 16 hard sector
HARD ERRORS	1 in 100 billion bits
SOFT ERRORS	Handled internally and logged
MTBF	8000 hours
MTTR	30 minutes
PART NUMBER	SK232D-SP2 (single sided drive) SK232D-SP7 (double sided drive)

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1.0 INTRODUCTION

The FDS-100 MINIFILE is an intelligent minifloppy disk system with self contained 5.25 inch floppy disk drive, power supply, microprocessor based controller and RS-232C interface. Its main application is low cost program loading and mass storage for computers or instruments.

A powerful file management resident in the firmware and high reliability makes it a very attractive replacement for paper tape and cassette/cartridge tape devices. But it offers a lot more in terms of versatility, speed, reliability and operator's convenience. The file management functions offered are comparable to those of some disk based computer systems.

The front panel keyboard is provided to allow control of all the file management functions. It is easy to use and allows an important advantage over similar or competitive units; in most applications, it does not require any special software handlers in the host computer or instrument. After you select a file for reading or writing on the Minifile's front panel keyboard, all that is necessary on the other end is to send or receive data at the selected BAUD rate.

2.0 FRONT PANEL CONTROLS AND INDICATORS

The front panel of the Minifile provides for diskette insertion and removal by means of a latching disk access door. This door should not be opened while the Minifile is in operation in order to avoid permanent loss of valuable data. The operator should note the status of the Minifile prior to taking any action of this nature; specifically when a file is *OPEN* and/or the head is *LOADED.*

2.1 Indicators

ACTIVITY	This indicator flashes when activity is is detected on the transmit or receive interface lines.
STATUS	This indicator identifies the three digit numeric display as an error code or status code.
FILE OPEN	This indicator flashes when a file is selected for reading or writing.

2.2 Numeric Display

System status and error information is communicated to the operator by means of a 3 digit - seven segment numeric display. Status codes and messages are given in the list of System Status Information (see section 4.0). The operator may obtain additional information on command such as the contents of the directory and free space available through this display.

2.3 Keyboard

The entire file management is firmware resident. Control of all the file management functions is available to the operator by means of the 3 x 4 numeric keyboard located on the front panel. The entry sequence for all the functions available is given in the list of File Managements Commands (see section 3.0).

2.4 Rear Panel Controls

The Minifile has an *ON/OFF* power switch located on the rear panel above the *AC* line power connector. The line power connector is provided for easy disconnection of the line voltage when it is necessary to remove the cover from the Minifile.

** WARNING **

TO PREVENT ELECTRICAL SHOCK HAZARD DISCONNECT LINE CORD BEFORE REMOVING COVER. THIS OPERATION SHOULD BE PERFORMED BY QUALIFIED MAINTENANCE PERSONNEL ONLY

The rear panel also contains the connector for the RS-232C interface. Units with optional current loop interface have a second smaller connector designed to prevent accidental connection with incompatible signal levels.

3.0 FILE MANAGEMENT COMMANDS

*1*N#* *DEFINE FILE*

This command is for creating a file and enables writing on the diskette beginning at the first available sector. The entry N is a one or two digit number (1 - 99) which is entered into the directory. Future access to the file is identified by that number. Data transmitted to the Minifile are recorded in blocks of 160 bytes. The Close File command, which terminates this operation, causes any partial blocks to be recorded, and a final entry is made in the directory.

*2*N#* *SELECT FILE*

This command selects for reading the file N which was previously generated by a Define File command. The directory is searched for the entry N and the beginning of that file is obtained. The data recorded in that file are transmitted to the host or receiving device until the end of the file is detected or a Close File command is entered.

3# *CLOSE FILE*

The Close File command is entered by the operator to mark the completion of a Define File or Select File operation. In most applications, it is only necessary when all the data for a given file are transmitted to the Minifile. Select file operations automatically close the file when the end of the file is detected.

5# *DIRECTORY*

The Directory command displays the file ID numbers recorded in the directory beginning with the first entry. Depressing the # key causes successive entries in the directory to be displayed.

6# *ENABLE DC2/DC4 DETECTION*

This command is provided with the *(-SP5)* firmware option. When enabled, the Minifile begins recording data following

the first DC2 character and stops recording when DC4 is detected.

7# *DISABLE DC2/DC4 DETECTION*

This command is provided with the *(-SP5)* firmware option and disables the DC2/DC4 detection mechanism earlier described.

12# *DISPLAY ERROR COUNT*

This command displays a number maintained by the Minifile firmware which is an accumulation of errors detected when reading or writing on a diskette. This command is provided to enable the operator to note marginal or deteriorating diskettes before they become unusable. The error count is initialized to zero when power is applied or when the Reset command is entered.

N 2 = 110
N 5 = 300 BD
N 14 = 9600 "

13*N# *SET BAUD RATE*

The Set BAUD Rate command provides a convenient method of changing the BAUD rate at the RS-232C interface; thus overriding the switch settings which are only accessible by removing the cover. The value for N is obtained from the BAUD Rate selection table in section 5 of this manual. Entering a Reset command will set the BAUD rate back to that of the switch settings.

14*N# *SYNC MODE SELECT*

This command specifies a mode for synchronizing data transmitted by the Minifile to the receiving device. It is useful in that in many applications the receiving device will be unable to maintain the full rate of transfer. The modes specified by parameter N are as follows:

0 - No synchronization. This is the default mode when power is applied or when a Reset command is entered.

1 - Character sync mode. The Minifile transmits one byte for each byte received from the host device. The value sent by the host has no significance.

2 - X-ON/X-OFF. The Minifile transmits data until X-OFF

character is received from the host device. Data transmission is resumed when X-ON character is received.

73# *RESET*

The Reset command causes the Minifile to reinitialize in the same manner as if power is applied. Any data in a write file which was not closed by the Close File command is lost.

91# *FORMAT*

This command is required when a diskette is placed into service for the first time. The Format command writes all blocks, initializes the directory and verifies the diskette.

92# *INITIALIZE DIRECTORY*

The Initialize Directory command deletes all files from the diskette.

96# *VERIFY DISKETTE*

The Verify Diskette command performs a read check on all the blocks on the diskette. Failures are reported on the front panel numeric display. See section 4.0 of this manual for the definition of error codes.

97# *COMPRESS DISKETTE*

The Minifile system uses a file structure in which all the blocks on a diskette are allocated sequentially. The deletion of a file creates an unavailable area on the diskette unless the deleted file happened to be the last file defined. This command repacks the files and reclaims any space on the diskette which was unavailable due to the file deletion. The execution time is dependent on the number of deleted files, their sizes and relative positions. In most cases, this time will not exceed 3 minutes.

*98*N#* *DELETE FILE*

This command deletes file ID number N from the directory. That file can no longer be accessed. To Reallocate the available space from that file, a *COMPRESS DISKETTE* command must be issued.

4# *DISPLAY FREE BLOCKS*

The Display Free Blocks command displays the available space on the diskette. Minifile systems with single sided drives (89KB) display in terms of 160 byte blocks. Systems with double sided drives (179KB) display in terms of blocks / 2.

4.0 SYSTEM STATUS INFORMATION

System status is presented in the form of a numeric code on the front panel 3 digit display. This code is identified as status by the *STATUS* indicator and pertains to improper operating procedures or some form of condition or malfunction detected by the Minifile.

Listed below are the status codes presented by the Minifile and a description for each of the codes.

002	*FILE ALREADY EXISTS*	An attempt was made to define a file with an ID number which is currently defined in the directory.
003	*FILE DOES NOT EXIST*	The file selected for reading or deletion cannot be found in the directory.
004	*ILLEGAL COMMAND*	The command issued is not recognized by the Minifile
005	*DISKETTE FULL*	The diskette does not have room for the data transmitted or the directory has no room for an additional entry.
006	*END OF FILE*	The Minifile transmitted all the data in the selected file.
007	*INITIALIZE ERROR*	Data errors were encountered during Initialize or Format operation. The Minifile makes 16 attempts to recover prior to reporting this error.
008	*FILE ALREADY OPEN*	An attempt was made to define or select a file with one currently defined or selected respectively. The Close File command must be issued to avoid this condition.
009	*COMMUNICATION ERROR*	This error is a signal to indicate some error condition was detected during communication with the host

		device. The error condition can sometimes be attributed to improper BAUD rate or STOP bit selection. See section 5.0 of this manual on switch settings for the Minifile.
100	*DIRECTORY READ ERROR*	The Minifile was unable to read the directory without an error. This usually indicates an unformatted diskette.
101	*BLOCK CHECK ERROR*	A block on the diskette could not be read without error within 16 attempts.
103	*SEEK ERROR*	The Minifile was unable to verify the track position on the diskette before reading or writing a block of data.
104	*DISK TIME OUT*	This error indicates a disk I/O operation did not complete within 2 seconds. It is normally as a result of initiating a command without a diskette in the drive.
105	*WRITE PROTECT VIOLATION*	The diskette in the disk drive is write protected and the Minifile attempted to write on it.

5.0 SWITCH SELECTABLE OPTIONS

The FDS-100 Minifile offers a variety of switch selectable options which are set in accordance with the desired mode of operation. These options pertain to BAUD rate, number of STOP bits, hardware synchronization and selection of features provided for some custom applications. By removing the top cover from the Minifile, 2 eight position DIP switches are exposed (D1 and D2). These switches are mounted on the serial interface card inserted at the top of the unit. The switch closest to the circuit card edge is D2.

Two switches allow a selection of features desirable in some applications. They are somewhat related and described below.

SWITCH D2-7 - When this switch is open the Minifile will not send data until requested by a false to true transition of the Data Terminal Ready signal at the RS-232C interface. This option allows the host device to strobe the data from the Minifile. Switch D2-8 must be closed when this option is selected.

SWITCH D2-8 - When this switch is closed, the Minifile ignores the state of the input signals Data Terminal Ready and Request To Send at the RS-232C interface. When this switch is open, switch D2-7 must be closed and both Data Terminal Ready and Request To Send must be true for the Minifile to accept data from the host device.

Settings for BAUD rate and STOP bit selection are described in tables 1 and 2 of this manual. Custom features are described in Appendix A.

BAUD RATE SELECTION

TABLE 1.0

BAUD RATE	D-1 SWITCH SETTING 1	2	3	4	KEYBOARD
50	C	C	C	C	0
75	O	C	C	C	1
110	C	O	C	C	2
135	O	O	C	C	3
150	C	C	O	C	4
300	O	C	O	C	5
600	C	O	O	C	6
1200	O	O	O	C	7
1800	C	C	C	O	8
2000	O	C	C	O	9
2400	C	O	C	O	10
3600	O	O	C	O	11
4800	C	C	O	O	12
7200	O	C	O	O	13
9600	C	O	O	O	14

STOP BIT SELECTION

D2=Closest to PWB EDGE

TABLE 2.0

STOP BITS	D-2 SWITCH SETTING 7	8
1	O	C
1½	C	O
2	O	O

O - OPEN / OFF
C - CLOSED / ON

RS-232C INTERFACE CONNECTOR (DB25S) PIN ASSIGNMENTS

TABLE 3.0

PIN	SIGNAL	DIRECTION	COMMENT
1	*PROTECTIVE GROUND*		*DC COMMON*
2	*TRANSMIT DATA*	*INPUT*	
3	*RECEIVE DATA*	*OUTPUT*	
4	*REQUEST TO SEND*	*INPUT*	*MUST BE TRUE* *
5	*CLEAR TO SEND*	*OUTPUT*	*TRUE WHEN FILE OPEN*
6	*DATA SET READY*	*OUTPUT*	*TRUE WHEN FILE OPEN*
7	*SIGNAL GROUND*		*DC COMMON*
8	*DATA CARRIER DETECT*	*OUTPUT*	*ALWAYS TRUE*
20	*DATA TERMINAL READY*	*INPUT*	*MUST BE TRUE* *

* *SIGNAL IS IGNORED WHEN SWITCH POSITION D2-8 IS CLOSED*

APPENDIX A

A.1 -SP2/-SP7 OPTION

This section applies to the FDS-100SKC Minifile, PN: SK232D-SP2 and -SP7. This unit is an enhanced version of the Minifile to allow a *READ FILE* and *WRITE FILE* open simultaneously. Its primary purpose is to allow editing of a previously created file. To enable this mode of operation, switch positions D2-6 and D2-7 must be *OPEN/OFF* and D2-8 must be *CLOSED/ON*.

A.1.1 Timing considerations

Simultaneous read and write operations introduce some timing considerations which the Minifile would not be sensitive to in its normal mode of operation. Do to the physical placement of files on the diskette, the drive mechanism is required to perform lengthy seek operations between read and write operations; thus sometimes introducing a latency at the RS232C interface. To overcome the interlock problem between the host and Minifile, a form of synchronous communication is provided. In addition, with the switches set as described above, the Minifile will only transmit a single character to the host device following the *FALSE* to *TRUE* transition of the *DATA TERMINAL READY* input signal.

When a write file is defined via the front panel keyboard, the *DATA SET READY (DSR)* and *CLEAR TO SEND (CTS)* are set to the *TRUE* state. Following a character transmitted by the host device, the *DSR* signal is set *FALSE* and remains *FALSE* until the Minifile is ready to receive the next character. If there is space available in the internal buffers of the Minifile, the *DSR* signal is immediately elevated to the *TRUE* state. Otherwise, it remains *FALSE* until a buffer is written to the diskette. The host device should only transmit data when *DSR* is *TRUE*.

There are other techniques to avoid overrunning the Minifile. The selection of the slower BAUD rates will provide the Minifile time to

write its buffers to the diskette. Also, by transmitting blocks of 160 bytes or less and introducing a delay will accomplish the same thing. Should an overrun occur, a Communication Error is displayed at the front panel.